CLAIMS

1 1.   A method suitable for use in a communication device for determining the
2 disposition of incoming e-mail from a sender, said method comprising the steps of:

3   establishing the identity of the sender to provide a sender identifier;

4   determining a cumulative penalty count value associated with said sender
5   identifier;

6   retrieving a system resource usage status associated with the communication
7   device; and

8   processing the incoming e-mail on the basis of said cumulative penalty count
9   value and said system resource usage status.

1 2.   The method of claim 1 wherein said step of establishing the identity of the
2 sender comprises the step of ascertaining an IP address for the sender.

1 3.   The method of claim 1 wherein said step of establishing the identity of the
2 sender comprises the step of associating the sender with a peer IP address of the
3 sender TCP connection.

1 4.   The method of claim 1 wherein said step of determining a cumulative penalty
2 count value comprises the step of assessing a penalty count value to said sender
3 identifier for an undesirable activity associated with the sender.

1 5.   The method of claim 4 wherein said cumulative penalty count value comprises
2 an activity penalty count charged to the sender for current undesirable sender activity
3 and a time-dependent penalty count determined from previous undesirable sender
4 activity.

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1   6.   The method of claim 5 wherein said time-dependent penalty count comprises a

2   zero value subsequent to a pre-established retention period.

1   7.   The method of claim 5 wherein said time-dependent penalty count comprises a

2   prior activity penalty count value reduced by a decay factor.

1   8.   The method of claim 4 wherein said undesirable activity comprises a member

2   of the group consisting of: sending a large number of e-mails, sending e-mails of

3   relatively large sizes, using a relatively large amount of TCP connection time, and

4   causing a TCP timeout.

1   9.   The method of claim 1 wherein said system resource usage status is a function

2   of a member of the group consisting of: the number of concurrent TCP connections

3   being maintained, the number of e-mail files in an incoming message queue, and the

4   amount of disk space being utilized for an incoming message queue.

1   10.   The method of claim 1 wherein said step of processing the incoming e-mail

2   comprises the step of assigning an operating state to the communication device, said

3   operating state being a function of said system resource usage status.

1   11.   The method of claim 10 wherein said operating state is a member of the group

2   consisting of: a normal operating state, a selective-rejection operating state, and a

3   random-rejection operating state.

1   12.   The method of claim 11 wherein, for said selective-rejection state, if said

2   cumulative penalty count value has a zero value, said step of processing the incoming

3   e-mail comprises the step of accepting the incoming e-mail.

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1 13. The method of claim 11 wherein, for said selective-rejection state, if said

2 cumulative penalty count value has a nonzero value, said step of processing the

3 incoming e-mail comprises the steps of:

4   specifying a rejection factor;

5   generating a random number; and

6   randomly rejecting the incoming e-mail on the basis of said rejection factor and

7   said random number.

1 14. The method of claim 13 wherein said step of randomly rejecting comprises the

2 step of accepting the incoming e-mail if said random number is greater than said

3 rejection factor and rejecting the incoming e-mail if said random number is not

4 greater than said rejection factor.

1 15. The method of claim 13 wherein said rejection factor is increased if said

2 system resource usage status increases and said rejection factor is decreased if said

3 system resource usage status decreases.

1 16. The method of claim 11 wherein, for said random-rejection state, if said

2 cumulative penalty count value has a nonzero value, said step of processing the

3 incoming e-mail comprises the step of rejecting the incoming e-mail.

1 17. The method of claim 11 wherein, for said random-rejection state, if said

2 cumulative penalty count value has a zero value, said step of processing the incoming

3 e-mail comprises the steps of:

4   deriving a resource usage factor;

5   generating a random number; and

6   randomly rejecting the incoming e-mail on the basis of said resource usage

7   factor, said random number, and said cumulative penalty count value.

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1   18.   The method of claim 17 wherein said step of randomly rejecting comprises the

2   step of accepting the incoming e-mail if said random number is greater than a product

3   of said resource usage factor and said cumulative penalty count value, and rejecting

4   the incoming e-mail if said random number is not greater than said product of said

5   resource usage factor and said cumulative penalty count value.

1   19.   The method of claim 18 wherein said resource usage factor is increased if said

2   system resource usage status increases and said resource usage factor is decreased if

3   said system resource usage status decreases.

1   20.   A communication device for determining the disposition of incoming e-mail

2   from a sender, said device comprising:

3   a penalty count filter module having

4   means for identifying the sender;

5   means for assigning a penalty count to the sender, said penalty

6   count being a function of undesirable activity associated

7   with the sender;

8   means for determining a resource usage value for said

9   communication device in receiving e-mail;

10   means for specifying an operating state for said penalty count

11   filter module, said operating state being a function of said

12   resource usage value; and

13   an accept/reject filter for disposing of the incoming e-mail on the

14   basis of said sender penalty count and said operating state.

1   21.   The device of claim 20 wherein said means for identifying the sender includes

2   means for obtaining at least one of a Domain Name Service verification and a peer IP

3   address of the sender TCP connection.

1   22.   The device of claim 20 wherein said undesirable activity comprises a member

2   of the group consisting of: sending a large number of e-mails, sending e-mails of

3   relatively large sizes, using a relatively large amount of TCP connection time, and

4   causing a TCP timeout.

1   23.   The device of claim 20 wherein said system resource usage status is a function

2   of a member of the group consisting of: the number of concurrent TCP connections

3   being maintained, the number of e-mail files in an incoming message queue, and the

4   amount of disk space being utilized for an incoming message queue.

1   24.   A communication device for determining the disposition of incoming e-mail

2   from a sender, said device comprising:

3   a sender penalty count data structure for storing a current penalty count value

4   associated with the sender;

5   a system resource usage status file for storing a current usage status value for

6   device e-mail processing resources; and

7   an accept/reject filter for disposing of the incoming e-mail on the basis of said

8   penalty count value and said usage status.

1   25.   The device of claim 24 wherein said sender penalty count data structure

2   includes an entry comprising a member of the group consisting of: a sender

3   identification value, a cumulative penalty count value, a cumulative e-mail count, a

4   total e-mail size, a total TCP connection time, and a timestamp value.

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1 26.   A method suitable for use in a communication device for determining the
2 disposition of incoming e-mail from a sender, said method comprising the steps of:

3   identifying the e-mail sender by determining a sender IP address;

4   obtaining a previous sender penalty count value calculated for said sender IP
5   address; and

6   accepting or rejecting the incoming e-mail based on said sender penalty count
7   value.

1 27.   The method of claim 26 further comprising the steps of:

2   maintaining a behavior trace table entry for the e-mail sender; and

3   determining said previous sender penalty count from said behavior trace table.

1 28.   The method of claim 27 further comprising the step of updating sender
2 behavior values in said trace table entry in response to receipt of a sender e-mail.

1 29.   The method of claim 28 wherein said sender behavior values include a
2 member of the group consisting of: the number of e-mails, the total size of e-mails,
3 and the total time of TCP connection time.

1 30.   The method of claim 28 wherein said step of updating sender behavior values
2 comprises the steps of:

3   reducing said behavior trace table value by a decay factor; and

4   adding a current behavior trace table value to said corresponding reduced
5   behavior trace table value.

1 31. The method of claim 30 wherein said decay factor is a function of the time

2 interval between the last two updates of said behavior trace table entry and a pre-

3 established retention period.

1 32. The method of claim 26 wherein said sender penalty count value is determined

2 from undesirable sender activity occurring over a pre-established retention period.

1 33. The method of claim 32 wherein said undesirable activity comprises a member

2 of the group consisting of: sending a large number of e-mails, sending e-mails of

3 relatively large sizes, using a relatively large amount of TCP connection time, and

4 causing a TCP timeout.

1 34. The method of claim 26 further comprising the step of updating said sender

2 penalty count value.

1 35. The method of claim 34 wherein said step of updating said sender penalty

2 count value comprises the steps of:

3   reducing said previous sender penalty count value by a decay factor to yield a

4   reduced sender penalty count value, said decay factor being a function of

5   said pre-established retention period; and

6   adding an activity penalty count value to said reduced sender penalty count

7   value to yield an updated sender penalty count value, said activity penalty

8   count value calculated as a function of current sender e-mail activities.

1 36. The method of claim 35 wherein said decay factor is further a function of the

2 time interval between calculation of said previous sender penalty count value and

3 calculation of said activity penalty count value.